TECHNICAL PROPOSAL

AIR MOBILITY AIRCRAFT PLAN

Packet A

Submitted to:

WASHINGTON STATE DEPARTMENT
OF TRANSPORTATION (WSDOT)

Submitted by:

Cignus Consulting LLC

Cignus

April 2, 2024

Washington State Department of Transportation (WSDOT)
310 Maple Park Avenue SE
P.O. Box 47300
Olympia, WA 98504-7300

RE: Air Mobility Aircraft Plan

Dear WSDOT Selection Committee,

Cignus (MBE/DBE) is very pleased to submit our proposal for the development of the Air Mobility Aircraft Plan for the State of Washington. We have assembled a team of experts for the Washington State Department of Transportation (WSDOT) that includes highly qualified subconsultants with a long history of research and development and planning expertise for Unmanned Aircraft Systems (UASs) as well as Advanced/Urban Air Mobility (AAM/UAM) solutions. Our team includes **Mosaic ATM**, an industry leader in UAS/UAM systems and operational concept integration.

Our subject matter experts have been actively involved with all of the areas that are integral to AAM operations and integration not only into the National Airspace System (NAS) but also at the local and regional planning levels including vertiport design and infrastructure. Our team continues to work on a variety of projects with the Federal Aviation Administration (FAA) and the National Aeronautics and Space Administration (NASA) on the definition and analysis of operational concepts, regulations, and safety risk management guidelines, including public and community outreach efforts.

Our highly qualified team of aviation and airspace analysts, economists, airport and vertiport engineers, environmental planners, transportation solution developers, and airport/airspace modelers are prepared and available to provide the requisite professional consulting services. Dr. Florian Hafner will serve as the team's project manager and client director, acting as the single point of contact for this team agreement. Dr. Hafner brings over 25 years of aviation experience working on some of the most complex transportation planning, modeling & simulation, Air Traffic Management (ATM) research, and project management projects. Dr. Hafner will also ensure that our company's core values are upheld throughout the project.

Innovation and Creativity - Our team will work with WSDOT to evaluate options and alternatives for AAM across the state and as appropriate, bring fresh emerging technology ideas and integration strategies to the project.

Responsiveness & Commitment - Our professional experts are committed to this project and have proven themselves with decades of experience on similar transportation planning projects, most recently working on the Virginia Aviation System Plan, Florida System Aviation Plan, and UAS Integration Into the NAS for the FAA. Our team understands the dynamic environment that surrounds AAM and our PM will ensure that all pertinent resources are available and responsive to WSDOT's needs and goals.

If you have any questions, please contact me at (571) 236-4674 or via email at vkhera@cignus.aero.

Sincerely,

Vinayak 'Vinnie' Khera
President & CEO
Cignus Consulting, LLC

1. Qualification and Experience of Firms

A The Cignus Team

For the successful completion of this project and associated tasks, Cignus has assembled a team that has been carefully selected based on the expertise and skills required for this project. In addition to Cignus, our team includes Mosaic ATM bringing many years of experience in the UAS/AAM arena as well as airport and airspace planning capabilities to this project.

Our team has a proven track record with AAM planning and integration into the NAS as well as aviation system planning and current experience working and supporting each of the areas outlined in the statement of work. In addition, our team has the available resources to quickly respond to any tasks that are required under this assignment. We are confident in our combined experience and skills to deliver this assignment in accordance with WSDOT expectations.

Our team of professionals have an expansive knowledge of airspace design, systems, and AAM integration into the NAS in terms of emerging technologies, federal/regulatory policy, and procedures.

Table 1: Team Capability Matrix

Cignus Team Capability Matrix		
SOW Tasks	**Cignus**	**Mosaic ATM**
State Aviation System Planning	X	
AAM Integration into the NAS	X	X
AAM Policy & Governance	X	
AAM Airspace and Systems	X	X
Vertiport Design & Infrastructure	X	X
Airspace & Procedure Design	X	X
Capacity/Delay Analysis	X	
Modeling & Simulation	X	
Project Coordination & Stakeholder Involvement	X	X
Project Document & Deliverables	X	X
Local Team Member		(1)

The following figure summarizes the overall team structure and support areas based on this expertise:

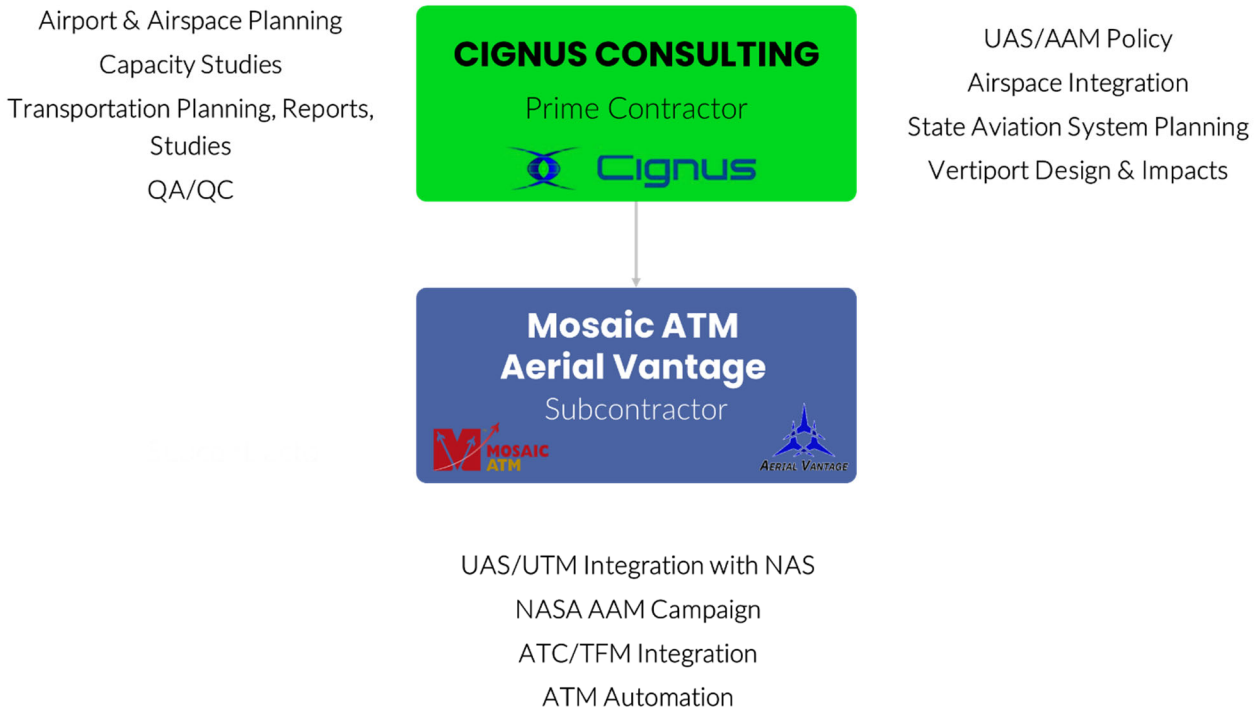


Figure 1: Company Organizational Chart & Support Areas

WORKING RELATIONSHIPS

Cignus has worked with our team member Mosaic ATM on several projects in a variety of leadership, support, and partner roles. Specific examples of this collaboration include:

- Boeing-led FAA NextGen Network-Enabled Operations (NEO) and Collaborative Information Management (CIM) programs exploring the benefits of enhanced SWIM-enabled flight information for UAS integration into the NAS. Cignus acted as team lead for operations planning with Mosaic ATM support on NEO and also as partners for FAA demonstration planning and execution of novel SWIM services at the FAA NextGen Testbed. The projects lasted from 2012 through 2016.

LOCAL EXPERIENCE

Our team members, Cignus and Mosaic ATM, include staff with experience in the State of Washington. Our proposed project manager, Dr. Hafner, has worked on two airport and airspace simulation studies for Alaska Airlines focused on Seattle Tacoma International Airport, one specifically focused on additional alternatives to the Airport Master Plan and the other on construction impact analysis for the north satellite terminal.

Mr. Khera, our airspace analyst, has also participated as a simulation analyst for these simulation studies and is familiar with the local airport and terminal airspace environment surrounding Seattle Tacoma. Mr. Khera also served as the Deputy Project Manager for Seattle Greener Skies, which was a complete airspace redesign of the current structure with Area Navigation and Required Navigation Performance (RNAV/RNP) procedures and concepts. As deputy project manager for this project, this not only gives our team an understanding of the local airspace and operations, but also valuable experience in local/regional outreach and community involvement efforts.

Looking at our team partner, Mosaic ATM, one of our team members, Ms. Erin Bugaj, resides and works in Washington. Prior to joining Mosaic ATM, Ms. Bugaj worked as an Aviation Analyst for Leidos Inc. at the Federal Aviation Administration's Western Service Center (WSC) in Des Moines, WA, giving her local airspace and facility experience that will support our team's efforts across the board. Ms. Bugaj also has experience with AAM concepts and operations through her involvement with the FAA's Advanced Air Mobility (AAM) Concepts Engineering and Design (CED) UAM Airspace Management Demonstration (UAMD) project.

STAFF AVAILABILITY

The following table outlines are key staff member availability over the core project cycle (through June 2025 when the initial report milestone is anticipated).

Table 2: Key Staff Availability

Key Team Member	Company	Role	Availability (Hours/Month)
Dr. Florian Hafner	Cignus	Project Manager	80
Mr. Vinnie Khera	Cignus	Deputy PM & Airspace Analysis SME	60
Mr. Randal Lawrence	Cignus	UAS/AAM Integration into the NAS Policy and Impact SME	120
Mr. Michael Yablonski	Cignus	Vertiport & Operations Analysis SME	80
Dr. Bill Dunlay	Cignus	Senior Advisor & QA/QC SME	40
Ms. Erin Bugaj	Mosaic ATM	AAM Systems, Data & Analytics SME	100
Mr. Stuart Wilson	Mosaic ATM	AAM Infrastructure & Systems SME	100

Both Cignus as well as Mosaic ATM have additional staff resources that we plan to utilize as needed to supplement key staff. Additional experience across all of the roles is available, including in the areas of AAM integration into the NAS, vertiport/infrastructure, transportation planning, and regulatory/policy.

B Firm Backgrounds

Cignus Consulting, LLC (Cignus)

Founded in 2007, Cignus is a small minority-owned disadvantaged business (MBE/DBE with Federal DOT certification) that specializes in providing aviation-focused consulting services in a variety of different fields, including:

- Transportation Planning
- Operations Planning & Research
- Simulation & Modeling
- Demand-Capacity Analysis and Forecasting
- Economic and Environmental Impacts
- UAS/AAM Integration into the NAS

Cignus' core areas of expertise revolve around the design, analysis, and quantification of airport and airspace operations and impacts. Primarily focused on the operational assessment and viability of proposed procedural, demand, and infrastructure changes, Cignus has conducted numerous studies for airports and ANSPs including all major NY area airports, Philadelphia International Airport, Dubai International Airport, Seattle-Tacoma International Airport, Moscow, Russia, Istanbul, Turkey and Dubai Air Navigation Services, to name a few. Cignus has also supported several aviation system planning projects, domestically and internationally, and continues to support the FAA in a variety of areas including UAV/AAM integration into the NAS, commercial space operations, as well as other future NextGen concepts.

Mosaic ATM (Mosaic)

Mosaic ATM has over 15 years of experience providing Air Traffic Management expertise under a multitude of aviation-related contracts with the FAA, the NextGen Program Office, NASA, aircraft operators, airports, academic institutions, and industry peers. Mosaic ATM delivers the next generation of technologies and procedures for both current and future Air Traffic Control (ATC) and Traffic Management systems. Mosaic has extensive experience supporting ATM automation system development and evaluation, including En Route Automation Modernization (ERAM), Terminal Flight Data Manager (TFDM), Time-based flow management (TBFM), Traffic Flow Management System (TFMS), System Wide Information Management (SWIM), and others.

Mosaic ATM is currently supporting the FAA's UAM Demonstration project through a subcontract with LS Technologies. Mosaic is providing expertise related to UAM and Unmanned Aircraft System Traffic Management (UTM) operations to support the engineering team tasked with informing

multiple aspects of the concept development and demonstration effort. For example, Mosaic ATM performed an analysis of the UTM and UAM concepts to document key differences between expectations for UAS Service Suppliers (USSs) and Provider of Services for UAM (PSUs). A key goal of the analysis was to inform UTM participants of capabilities and requirements they should consider incorporating into their offerings if they want to also provide UAM services. Through Mosaic's role on this project, Mosaic ATM is also supporting the FAA in developing their roadmap of infrastructure and capabilities needed to support the introduction of UAM operations into the airspace. Through their NAS, UAS, and AAM integration experience, Mosaic was also a contributing partner to the current NASA "*High-Density Automated Vertiport Concept of Operations*".

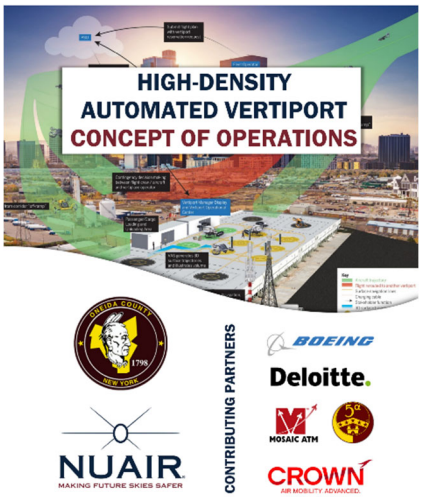


Figure 2: High Density Automated Vertiport ConOps

Mosaic is also participating in NASA's Advanced Air Mobility (AAM) National Campaign, upgrading its data collection and analysis system with a state-of-the-art Knowledge Graph system called "Aerograph." Mosaic ATM also received a NASA award to use deep learning to predict the low-altitude signal strength of an Advanced Air Mobility vehicle.

Mosaic's research on UAS integration into the NAS Artificial Intelligence (AI) has been at the leading edge since our founding in 2004. This work includes simulation studies, technology architecture trade studies, experimental UAS operations, program support in developing the FAA's UAS Implementation Plan, and UAS demand forecasting.

Mosaic ATM also oversees a subsidiary company called Aerial Vantage, which was founded to combine Mosaic's manned and unmanned aviation experience with advanced expertise in AI, Machine Learning (ML), and computer vision to help customers tackle drone operations challenges with robust technology solutions. As a close cousin to AAM operations in terms of integration into the NAS and the underlying traffic management systems, direct UAS expertise is a critical building block for many AAM strategies and integration efforts.

Firm: Cignus

Location: Washington, DC

Features

- Program Management
- Coordination and Facilitation
- Safety Management
- UAS/UAM Policy, Strategy, Integration
- FOIA Requests

Duration of Contract

2021 - Current

Client Reference

Michael. R. Beckles

Federal Aviation Administration

800 Independence Avenue SW, Washington, DC 20591

E-mail:

Michael.R.Beckles@faa.gov

Phone:

202.267.7100

UAS Integration into the NAS

Summary

Cignus is providing operational and analytical services to FAA AJV in support of the ongoing integration of Unmanned Systems into the NAS. Our team provides operational ATC SME support in the areas of operations research, FAA guidance documentation, FAA policy/rule-making, FOIA and documentation management. We develop & support UAS operational concepts evaluation, missions, and platforms as well as the integration into NAS airspace and systems. We also support various FAA working groups, conduct impact assessments and develop documentation for FAA leadership. A significant part of the support is focused on developing policy that drives nationwide AAM/UAM plans and requirements for safe and successful performance.

Specifically, Cignus is providing the following support to AJV:

- Providing Subject Matter Expertise (SME) in ATC operations and assisting in operational research related to the integration of Unmanned Systems into the National Airspace System (NAS).
- Evolution of UAS policy and procedures for integration of UAS into the NAS
- Safety Risk Management (SRM) policy and compliance
- Facilitation and coordination of information regarding the integration of UAS into the NAS
- UAS, UAM, and AAM technical, analytical, and business planning
- Advising on FAA guidance, policy, and documentation relevant to Unmanned Systems integration.
- Managing Freedom of Information Act (FOIA) requests and related documentation. Ensuring compliance with documentation requirements and regulations.
- Evaluating operational concepts related to UAS and providing insights into the feasibility and effectiveness of proposed UAS operations.

Firm: Mosaic ATM

Location: NASA Langley

Features

- Vertiport Systems & Automation
- High-Density UAS/AAM Operations
- Vertiport Autonomy
- Risk Assessments

Duration of Contract

2022 - 2023

Client Reference

Jeff Homola

UTM Integration & Test Lead

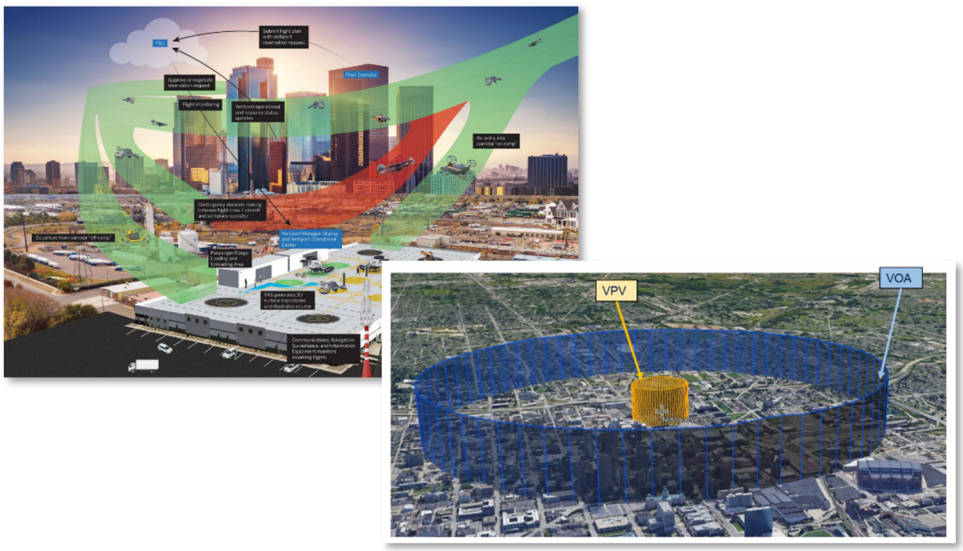
NASA

Email: jeffrey.r.homola@nasa.gov

Phone:

650.495.5546

NASA High Density Vertiport



Summary

The High Density Vertiplex (HDV) project is intended to develop a prototype Vertiport Automation System (VAS) to assess scalable and efficient aircraft operations, flight and airspace management procedures, and interoperability of capabilities needed to support the expansion of sUAS Part 135 Operations and contribute to the achievement of UML 4. The project was broken up into the following phases:

- *Advanced Onboard Automation (AOA)*
  Develop reference automation architecture prototypes, integration guidelines, and safety risk assessments that support increasingly autonomous and resilient operations.
- *Scalable Autonomous Operations (SAO)*
  Develop and evaluate concepts, prototypes, procedures and technologies supporting operations at increased scale from a vertiport.
- *Vertiplex Operations (VO)*
  Develop and evaluate concepts, procedures and technologies to evaluate system prototypes supporting high density operations in and out of multiple nearby vertiports.
- *Integration of Automated Systems 2 HDV (IAS 2.HDV)*
  Develop and evaluate vertiport automation reference architecture for a representative UAM aircraft in a vertiplex environment.

This phase of the project concluded early upon successful completion of the SAO phase. Major accomplishments include establishing a UAS testing range capable of supporting Beyond Visual Line of Sight (BVLOS) operations. This capability enabled the team to provide a realistic test environment for the VAS.

Firm: Cignus

Location: Sonoma County, CA

Features

- ATC Procedure Design & Evaluation
- PBN Procedures
- ILS Assessment
- Airspace Evaluation
- Stakeholder & Community Outreach
- Emerging Technologies

Duration of Contract

2022 - Current

Client Reference

Jon Stout, AAE, CAE

Airport Manager

Charles M. Schulz – Sonoma County Airport

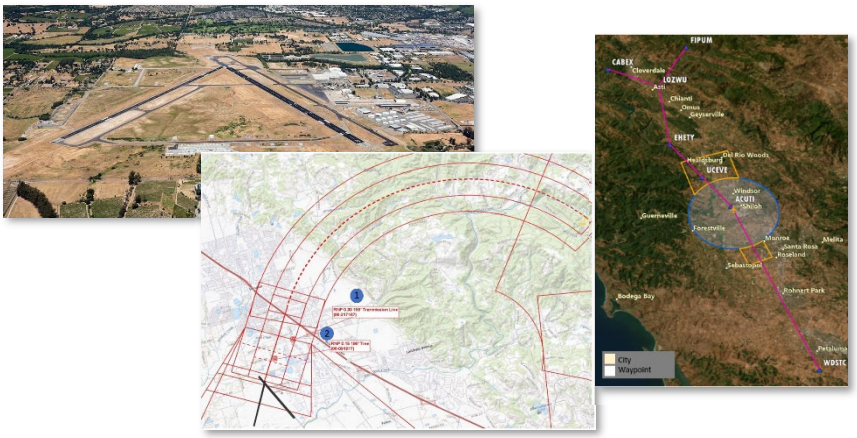
2290 Airport Blvd.

Santa Rosa, CA 95403

E-mail: jon.stout@sonoma-county.org

Phone: 707.565.7243

Sonoma County Airspace Procedure Assessment & Design



Summary

Cignus is currently providing ATC procedure development, airspace impact analysis, and community outreach support to Charles M. Schultz Sonoma County airport (STS). As a small airport in northern California's wine country, STS is predominantly a General Aviation airport with a mix of airline service, GA traffic, and other air serivice operations. Signficant regional airspace design impacts and noise concerns exist along with terrain that has forced STS to implement non-standard approach and departure procedures, which Cignus is currently re-assessing and updating.

Given it's proximity to San Francisco and in the middle of wine country, further assessments of operational and noise impacts from expected emerging technologies such as UAM/AAM are also being explored.

Specifically, Cignus is providing the following services to Sonoma County:

- PBN (RNAV/RNP)procedure assessment and design for all STS runways
- Assessment of Continuous Descent approach procedure feasibility and benefits
- ATC radar track, dispersion, and altitude profile analysis
- Noise and population impact analysis
- Obstruction database evaluation and update as needed
- Analysis of ILS upgrade capabilities and feasibility
- Northern California airspace procedure integration analysis
- Emerging Technology and Operational Concepts
- Stakeholder and community outreach planning and execution including workshops and meetings

2. Project Manager Qualifications

FLORIAN HAFNER, PHD

Hafner has spent nearly 25 years as a consultant, engineer, and manager in the aviation industry. He is a recognized expert in aviation operations planning and operations research, particularly in the area of airfield and airspace simulation, modeling, emerging technologies, and operations analysis.

Dr. Hafner has led and supported numerous airport and airspace design and analysis studies focused on major capital improvements, procedural design changes, demand/capacity operational impact assessments, as well as NextGen concepts and technologies. He has also managed operational impact studies focused on UAS integration into the National Airspace System (for the FAA Nextgen office) and led early impact assessments of UAM/AAM operations into Virginia's state aviation system, areas that he has been involved in for nearly 15 years.

In his current role as Sr. VP & CTO for Cignus, Dr. Hafner oversees consulting and support projects in the areas of emerging technologies, digital transformation, and systems engineering. As a former Assistant Director for ATM Research at Embry-Riddle Aeronautical University, Dr. Hafner is intimately familiar with emerging technologies and operational concepts and in managing impact studies and decision-support tool design and development across a variety of airport and airspace environments.

CERTIFICATIONS

- Project Management Professional (PMP) – Project Management Institute, November 2022

RELEVANT PROJECT MANAGEMENT EXPERIENCE

Virginia Air Transportation System Plan Update, Virginia Department of Aviation (DOAV)

Role: Internal Project Manager

Timeline: March 2021 – October 2022

Client: Virginia Department of Aviation – as sub-contractor to Mead & Hunt

Project Description:

Responsible for the delivery of several tasks for Virginia's 2023 VATSP update project. Dr. Hafner managed the airport inventory and survey/community outreach tasks, which formed an integral part of the system planning effort and supported the definition and analysis of key performance measures throughout the project. He also led the analysis and definition of current airport issues impacting Virginia airports through emerging technologies such as UAS, remote towers, and eVTOL aircraft (UAM/AAM).

Mid/Long-Term Capital Planning for PANYNJ, New York, NY

Role: Project Manager

Timeline: December 2022 - Current

Client: Port Authority of New York and New Jersey (PANYNJ) – Prime Contractor

Project Description:

On-call capital planning support for the Port Authority of New York and New Jersey (PANYNJ). Dr. Hafner manages the consulting team responsible for analyzing existing airport infrastructure and development project needs, descriptions, and feasibility along with alignment with the larger PANYNJ Capital Improvement Program (CIP).

Florida Aviation System Plan Update, Florida Department of Transportation (FDOT)

Role: Internal Project Manager

Timeline: November 2022 – April 2024

Client: Florida Department of Transportation (FDOT) – as sub-contractor to Mead & Hunt

Project Description:

Dr. Hafner is currently responsible for all Cignus tasks and deliverables for the latest FASP Update 2043, including the development of a detailed inventory database of facilities, infrastructure, and systems across the state of Florida. Cignus developed and managed the stakeholder survey effort. Cignus was also leading a digital technology and transformation task, focused on the development of cloud-based analytical dashboards and services for stakeholders.

WORK HISTORY

2014 - Present	Cignus Consulting, LLC (VP & CTO)
2015 - Present	Embry-Riddle Aeronautical University (Adjunct Professor, Systems Engineering)
2007 - 2014	Hafner Engineering, LLC – now Cignus (CEO)
2006 – 2007	Crown Consulting, Inc. (JPDO Subject Matter Expert)
2003 – 2006	Embry-Riddle Aeronautical University (Assistant Director, ATM Research)
2002 – 2003	Preston Aviation Solutions - now Jeppesen (Customer Support Manager)
1998 – 2002	Embry-Riddle Aeronautical University (Sr. Researcher)
1997 – 1998	JDA Aviation Technology Solutions (Simulation Analyst)

OTHER RELEVANT PROJECT EXPERIENCE

Airspace Technologies Master Plan Project for Mexico, USTDA, Mexico

Lead Impact Analyst. Working with Mexico's Federal Civil Aviation Agency (AFAC), and under contract to TetraTech AMT, Dr. Hafner is currently leading the economic and development impact assessment tasks for this USTDA study, which is focused on assessing and upgrading Mexico's ATM system and operational concepts inline with ICAO standards. Cignus is also in charge of identifying and analyzing financing mechanisms for upgrades.

Seattle Tacoma International Airport Construction Modeling, Alaska Airlines, Seattle, WA

Simulation Analyst. Consulting engagement with Alaska Airlines to model several operational concepts for taxi flows near Terminal D and the North Satellite Terminal at SEA. Using Total Airspace and Airport Modeler, updated current Master Plan baseline models and developed and analyzed various alternative taxi and pushback configurations using throughput and delay.

Spaceport Analysis Toolkit (SAT) Prototype Platform, FAA, Washington, DC

Project Manager. Developed a cloud-based prototype GIS application that can be used to analyze the feasibility of proposed spaceport sites for various horizontal, vertical, and reentry operational scenarios and vehicles as part of the FAA spaceport site licensing lifecycle.

New Istanbul Grand Airport (IGA), Green-Field Airport and Airspace Capacity Assessment, USTDA IGA, Istanbul, Turkey

Lead Analyst. As part of the Jeppesen team and under a collaborative U.S. Trade and Development (USTDA) agreement with Istanbul Grand Airport (IGA), Dr. Hafner supported the

simulation-based analyses of various development phases for Istanbul's new IGA airport. Dr. Hafner also led the development of several other planning documents including an Economic Impact Assessment and a Development Impact report. Tools such as TAAM, TARGETS, and REDIM were utilized for operational impact analysis purposes.

Airport Cooperative Research Program (ACRP) Synthesis Report on Simulation Options for Airport Planning

Lead Author. Comprehensive Analysis of Current Industry Practices and Applications of Simulation Tools for Airport Planning and Design. The report presented a detailed database simulation tools for GIS planning and operational assessments which fed a decision framework for airport planners and designers to select the most appropriate tools.

UAS/TBO NextGen R&D, Federal Aviation Administration, Washington, DC

Operations Team Lead. As part of Boeing's Florida NextGen Testbed (FTB) Task U team, Dr. Hafner led the operations group in the definition of operational concepts, use cases, test plans, and demonstration scripts/plans in collaboration with the FAA and other stakeholders that focused on the use of TBO concepts for deconfliction and Time-Based Flow Management (TBFM). Dr. Hafner also led fast-time simulation-based assessments of UAS operations in Class A airspace using TBO focused on trajectory synchronization capabilities and requirements between automation systems and UAS vehicles.

New York Aviation System Capacity Study, PANYNJ, New York, NY

Airspace Simulation Lead for assessment of airspace impacts and efficiency for a capacity study focused on airport infrastructure expansions in the NY region. Used TAAM to assess design and analysis of RNAV/RNP procedures within the New York N90 TRACON. Developed strategies and tools for the evaluation of departure and arrival route demand/capacity imbalances at the TRACON/En-Route boundaries for future demand levels and the newly proposed procedures.

Airfield and Airspace Analysis, New York System Airports, PANYNJ, New York, NY

Simulation Analyst responsible for operational analysis of various airfield development projects across New York airports. Determined impact on delay, capacity and efficiency using fast time simulation (AirTOp, TARGETS, REDIM, and TAAM) with focus on airfield and terminal redevelopment, airspace procedures assessment, as well as proposed business schedules for major airlines. Assessed construction impacts, performing analysis on what-if scenarios for managing delays and operations during proposed construction.

Dubai International Airport PBN Procedure Evaluation and Capacity Optimization, MITRE & DIA, Dubai

Simulation Analyst. Provided AirTOp fast-time simulation and analysis expertise for several airport capacity enhancements and airspace redesign projects at DIA and within the UAE. In addition, assessed operational impacts of a new ICAO closely spaced parallel runway simultaneous approach procedure.

Airfield/Airspace Analysis, Boeing Commercial Aviation Services (CAS), Moscow, Russia

Simulation Analyst responsible for PBN procedure operational and safety assessments. This project focused on the development and evaluation of RNAV/RNP PBN procedures for the three primary airports in the Moscow TMA. The project also included the evaluation of the newly designed procedures in terms of airspace efficiency, capacity, and safety using the Total Airspace and Airport Modeler (TAAM) software.

3. Qualification and Experience of Staff

Our team is made of up several key individuals that all bring very unique expertise and knowledge to this project. The core team and team structure for this project is illustrated in the below Figure and includes:

- Dr. Florian Hafner – Project Manager
- Mr. Vinayak 'Vinnie' Khera – Deputy Project Manager & Airspace Analysis SME
- Mr. Randal Lawrence – UAS/AAM Integration into the NAS Policy and Impact SME
- Mr. Michael Yablonski – Vertiport & Operations Analysis SME
- Ms. Erin Bugaj (Mosaic ATM) – AAM Data & Analytics SME
- Mr. Stuart Wilson (Mosaic ATM) – AAM Infrastructure & Systems SME
- Dr. William 'Bill' Dunlay (WJDunlay) – Senior Advisor & QA/QC SME

The following section contains more detailed descriptions of key staff members of the Cignus team that will be dedicated to the efforts as required to complete analysis, documentation, and outreach tasks.

Mr. Vinayak 'Vinnie' Khera – Cignus

Role: Deputy Project Manager and Airspace Analysis SME

Mr. Khera has spent nearly 25 years in the aviation industry. During this time, he has had significant experience in the management and technical aspects of aviation policy, research, development, integration and modeling simulation combined with program and functional management. Mr. Khera as it relates directly to this project has worked on planning studies, modeling, forecasting, concept development, design review, agency coordination, obstruction evaluation studies, facilitation and visioning, as well as public outreach for airport clients, federal government as well as air navigation service providers.

Mr. Khera most recently has overseen high visibility Airport & Airspace planning projects for Newark International Airport, Istanbul, Turkey and New York's JFK Airport focused on Redevelopment Initiatives. Mr. Khera has experience with small, medium and large hub airports and has led airport planning, environmental planning as well as obstruction evaluation studies in the US and Overseas. He is also an active participant in TRB's Effects of Aviation on the Environment Committee, the NextGen Airports Working Group and Environment Working Group, and the Airport Consultant Council's Planning and Globalization & Harmonization Committee.

Mr. Khera has significant experience as both a technical and administrative lead on large and complex private as well as government contracts and has a proven record of delivering timely and effective products and services. He combines technical insights into emerging aviation concepts and technologies with strong organizational and managerial skills and has shown to be a successful manager by enforcing schedules and budgets, resource planning, program risk management, and program quality controls.

Mr. Randal Lawrence – Cignus

Role: UAS/AAM Integration into the NAS Policy and Impact SME

Mr. Randal Lawrence holds a pivotal role as the UAS/AAM Integration into the NAS Policy and Impact SME. Mr. Lawrence brings his extensive experience across various aviation entities, as well as his involvement with air traffic control facilities including Chicago and Minneapolis TRACON and Tower. Mr. Lawrence specializes in UAS and UAM operations with recent experience in the development and processing of Document Change Proposals (DCP's) for FAA Orders, manuals, and publications related to UAS/UAM, and Commercial Space operations. Through his work at the FAA, he is well versed with notifications to affected facilities and Service Area Assistant General Managers for planned Counter UAS (C-UAS) deployments and has also represented AJT-3120 in critical meetings with the Department of Justice (DOJ) and Department of Homeland Security (DHS) for C-UAS deployment reviews. Additionally, he is well adept at addressing inquiries from FAA and FCT facilities regarding UAS and C-UAS situations, assisting with LAANC and UASFM requests, and developing presentations for UAS and UAM procedural development.

Mr. Lawrence's contributions extend to conducting research for UAS, UAM, and AAM routing affecting air traffic services, planning proposed Vertiports, and aiding in pending rules and procedures for Beyond Visual Line of Sight (BVLOS) sUAS and UAS. His commitment to thorough research and proactive engagement has ensuref readiness to address potential negative effects on air traffic control facilities in the NAS, further solidifying his role as a trusted authority in UAS/AAM integration. Additionally, his previous tenure as an Air Traffic Procedures Specialist at ABSS Solutions in Washington DC underscores his proficiency in facilitating change requests, serving as a Subject Matter Expert (SME) on Safety Management System (SMS) Panels, and delivering comprehensive presentations and documentation in compliance with technical writing procedures.

Mr. Michael Yablonski – Cignus

Role: Vertiport & Operations Analysis SME

In his current role as Director of Transportation Planning for Cignus, Michael is responsible for landside, airside, and airspace consulting efforts bringing with him more than 38 years of aerospace/systems engineering experience with focus on air traffic simulation and modeling. Michael has applied his vast experience to analyze and address challenges focused on airport surface congestion, terminal area procedure design, metroplex airspace, en-route airspace, air traffic controller workload/staffing, advanced air mobility system integration, spaceport launch impacts, investment planning/analysis and decision analytics.

Michael is a former rotorcraft engineer with experience in aeromechanics, dynamics/vibration, wind tunnel and flight testing of the V-22 Tiltrotor Aircraft along with engineering research experience for highspeed Civil Tiltrotors and UAS types. More recently with the advent of Advanced Air Mobility, and in partnership with AvMet Applications, Inc., he developed a realistic network model of AAM operations for the New York City Metropolitan area using state-of-the-art airspace design, simulation, and modeling tools. This effort consisted of expert input and guidance for the design/operation of a practical NYC AAM model during normal and disrupted conditions due to weather. The simulation model included proposed AAM infrastructure including multi-pad vertiports, flight corridors and eVTOL operations that provides a blueprint to further collaborate and stimulate the discussion for AAM network system requirements for safe implementation in a major metropolitan area. The result of this effort was a technical paper "Simulation-Assisted, Weather-Aware Urban Air Mobility System Planning" that was presented at the Operations Technical Session at the Vertical Flight Societies 79th Annual in West Palm Beach, FL. The paper was awarded "Best Presentation" for the session.

Michael has constructed AAM Models of Urban Areas throughout the United States to better understand infrastructure and integration issues with current airspace operations. Moreover, Michael developed a detailed Total Airspace and Airport Modeler (TAAM) model of the Chicago metropolitan Area for the Illinois Department of Transportation demonstrating operations between O'Hare International Airport, Chicago Executive Airport, Vertiport Chicago, Midway Airport and Downtown Lake Michigan Heliport. The model includes mixed eVTOL aircraft types for Archer, Lilium and Joby with simulation playback in the Cesium digital twins software tool. Heliport/Vertiport departure and arrival routes were designed along with landing area with taxi to/from parking pads. Detailed flight corridors were designed and integrated with the current O'Hare Class B and Midway Class C airspace.

Ms. Erin Bugaj – Mosaic ATM (Washington State Local Employee)

Role: AAM Data & Analytics SME

Erin Bugaj has over 12 years of data analysis experience, focusing on the analysis of flight traffic data across a variety of environments, systems, and emerging technology areas. Since joining Mosaic in 2021, Ms. Bugaj has provided analysis and subject matter expertise for several NASA and FAA projects, including AAM.

Ms. Bugaj supported the FAA's Advanced Air Mobility (AAM) Concepts Engineering and Design (CED) UAM Airspace Management Demonstration (UAMD) project. During this project she participated in the analysis and development of the AAM data management plan and data exchange requirements report, including a gap analysis of the current flight planning processes and the future requirements to integrate AAM into the National Airspace System (NAS).

Ms. Bugaj previously supported the FAA NextGen Emerging Technologies project. She has helped to develop automated scripts to process SWIM data and to match it with historical weather data for use in the development of machine learning models. Ms. Bugaj has performed various analyses of the current Time Based Flow Management (TBFM) trajectory models to quantify the accuracy of the models and possible sources of TBFM prediction variance.

Supporting the FAA's Terminal Flight Data Manager (TFDM) project, Ms. Bugaj develops geographical reports depicting various location features of the data that is used to aid in the analysis of the data quality. Utilizing the automated reports, Ms. Bugaj compiles areas of concern and suggests process improvements.

Prior to joining Mosaic ATM, Ms. Bugaj worked as an Aviation Analyst for Leidos Inc. at the Federal Aviation Administration's Western Service Center (WSC) in Des Moines, WA. She provided technical and analytical support to the WSC through statistical reports and presentations related to complex and sensitive airspace issues. Ms. Bugaj also developed algorithms and tools using Python to calculate metrics and process flight traffic data, from sources such as Micro-EARTS, into flight tracks and comprehensive analytical reports.

As an Aviation Analyst with ATAC in both Santa Clara, CA, and later at the WSC in Des Moines, WA, she provided technical and analytical support in analyzing airspace issues utilizing a wide array of airspace analysis tools including the Performance Data Analysis Reporting System (PDARS) and Terminal Area Route Generation Evaluation and Traffic Simulation (TARGETS). She designed and built automated reporting tools in Python using various data sources such as PDARS track files and FAA airspace shapefiles. Ms. Bugaj also supported the FAA Optimization of Procedures in the Metroplex (OAPM) project study teams, which included onsite analysis of air traffic data and visualizations.

Mr. Stuart Wilson – Mosaic ATM

Role: AAM Infrastructure & Systems SME

Mr. Wilson is a Systems Engineer with over 12 years of experience who combines a hands-on aviation background with deep technical knowledge of NAS systems and operations, aviation specific data, and enterprise infrastructure development. Mr. Wilson joined Mosaic ATM in 2018 and has performed both as an individual contributor and Project Lead. Currently, he is a Systems Engineer supporting the NASA Advanced Air Mobility – High Density Vertiport subproject, and currently supports the FAA NextGen Multi-Regional Trajectory Based Operations (MR TBO) project, in addition to supporting a Department of Transportation (DOT) Bureau of Transportation Statistics (BTS) effort to develop a database using FAA System Wide Information Management (SWIM) data.

Mr. Wilson gained leadership experience as the Lead Systems Engineer for the NASA National Campaign – Airspace Technology Integration (ATI) subproject, which is tasked with supporting the testing and evaluation of UAM aircraft flight testing and supporting AAM infrastructure. His main responsibilities were coordinating with the many industry partners, NASA stakeholders, and FAA stakeholders to determine the goals and objectives of the ATI test infrastructure and from these derive a series of system-level requirements and software architectures. He coordinated with multiple NASA software teams to track the software development lifecycle, performing verification and validation to ensure software components comply with system requirements.

Mr. Wilson held a dual role as Project Manager and Systems Engineer for the FAA Traffic Flow Data Manager (TFDM) Surface Management Test Team. Additionally, he supported systems engineering efforts on multiple projects, such as NASA Airspace Technology Demonstration 2 (ATD-2) and NASA AAM - Vertiport Automation Project.

As the Lead Systems Engineer for the NASA AAM - Vertiport Automation Project, Mr. Wilson was tasked with designing a Vertiport Automation System capable of supporting the operation of hundreds of UAM aircraft into and out of a metroplex environment each hour. To achieve this, Mr. Wilson led a team of engineers to design a system capable of managing vertiport resource availability and scheduling, coordination with UAM fleet operators, and continual monitoring for potential hazards. The resulting software architecture, system requirements, and use cases were captured in the MBSE model. In leading this development work, Mr. Wilson utilized his systems engineering experience, project management experience, aviation safety education, and knowledge of aviation demand/capacity balancing concepts.

Prior to joining Mosaic ATM, Mr. Wilson worked at LS Technologies LLC, directly supporting the FAA SWIM Program Office. He started his career at Harris Corporation from June of 2010 to May of 2017, where he supported numerous projects as a Systems Engineer and Project Manager, including several contracts with the FAA and Florida NextGen Test Bed (FTB). He also led the development of commercial aviation products.

Dr. William 'Bill' Dunlay – Cignus

Role: Senior Advisor & QA/QC SME

Dr. Dunlay has more than 40 years of experience in airport planning. He has directed airfield and airspace capacity and operational studies for more than 50 airports and airport systems in the United States and overseas.

In 2020 Dr. Dunlay completed (1) a presentation with PANYNJ to FAA of a White Paper titled "Future Runway Capacity Outlook, JFK International Airport," and (2) Oversight of Airfield Simulation Analyses of Build and No- Build Alternatives in an Environmental Assessment (EA) of proposed terminal and

taxiway improvements at Seattle-Tacoma International Airport. In 2019 he served as (1) a senior advisor to the PANYNJ on a taxiway systems access planning study for LGA, JFK, EWR, and SWF; and (2) a senior advisor to the PANYNJ on studies of EWR's future airfield capacity. In 2018 he undertook (1) an operational analysis for Fort Worth Alliance Airport, (2) an airfield simulation assignment at John F. Kennedy International Airport (JFK) for the PANYNJ, and (3) a senior advisor to the PANYNJ on studies of JFK's airfield expansion and future airfield capacity. In 2017 he completed (1) a regional airspace planning assignment for the Clark County Department of Aviation (Las Vegas), and (2) an airspace and airfield capacity review at LaGuardia Airport for the Port Authority of New York & New Jersey (PANYNJ).

4. Project Management System

The Cignus Team, led by our proposed Project Manager, Dr. Florian Hafner, is prepared to immediately respond and serve the needs of WSDOT under this task.

Dr. Florian Hafner, along with the project team, will initiate the program and task resource planning process upon contract award. This process engages with WSDOT to document task demands, plan task execution, and enumerate staff requirements and schedules. This information then forms the basis for our internal Task Plan and Master Schedule, which Dr. Hafner will review monthly with key staff members as needed. He will work with his task response team to finalize roles and responsibilities and, as appropriate, coordinate with WSDOT leads to gain approval of proposed staff. The Cignus Team uses the following proven project management:

Quality Control & Assurance - Delivering Precision and Accuracy

Our Deputy Project Manager, Mr. Vinnie Khera, along with our QA/QC SME Mr. Bill Dunlay will be responsible for adherence to a robust series of QC procedures. This will include personally reviewing all deliverable documents and data prepared and generated under this contract. They will ensure deliverable and performance satisfaction through feedback from WSDOT. Dr. Hafner, along with Mr. Khera, and if needed our QA/QC team will meet routinely with the WSDOT task lead(s) to review overall performance, to understand what we are doing well, and to identify and focus on areas for improvement.

Cignus' existing quality program provides guidance to our Task Leaders, requiring them to apply quality assurance protocols while work is being performed and use QC techniques to ensure deliverables meet our high standards. The external aspects concentrate on the prevention of problems through proactive communication and goal setting with WSDOT leadership. The internal components of our quality program will be applied across both firms and require ongoing monitoring and continuous improvement. Some key features of our quality program include:

- *Source Documentation:* Technical staff working on data collection and model development will fill out standard reference sheets, identifying data sources and assumptions about data fidelity.
- *Checking:* Client deliverables will be independently verified (by someone who is well qualified on the subject) as complete and correct. This will include a review of consistency and substance.
- *Reviewing:* An overall review of the written accuracy and clarity of deliverables will be performed by a senior staff member not involved in the project development.
- *Routine:* Quality reviews will be scheduled to coincide with project milestones, ensuring that issues are identified as early as possible.

Tracking and scheduling system

The Cignus Team utilizes a task focused approach to management and has demonstrated our capability to absorb workload fluctuations while producing quality and timely deliverables. This approach, as depicted in Figure 3, will deliver WSDOT tasks at lower cost because the right people and resources are identified and applied from the beginning of each task. WSDOT receives best value each time the Cignus Team is engaged because each task is treated as a project. We

Figure 3: Cignus Project Planning and Execution Process

are made up of technical, operational, and financial consultants who are accustomed to serving our clients diligently. The procedures help communicate internally and with WSDOT our approach for managing each individual task and measuring progress. To initiate each task,

For any new tasks, Dr. Hafner will gain WSDOT approval of key personnel, schedule, and technical approach. The Cignus Team will present the plan to WSDOT, including a task organization structure, delineation of responsibilities, a budget with labor, travel, and other direct cost estimates. It will also include a schedule with milestones and customer reviews and specify reporting requirements.

During execution of the task, Dr. Hafner will monitor performance, cost, and schedule against the baseline. Dr. Hafner will examine performance, as well as routinely review performance and progress with the WSDOT manager/lead. The reviews will focus on financial and schedule status to ensure that technical requirements are met in a timely and cost-effective fashion. They will examine progress toward task and project milestones and quality concerns and address staffing issues to ensure that the task remains staffed with qualified personnel. Quality and risk issues will receive special consideration. This structure of task management ensures the WSDOT receives Best Value for each task.

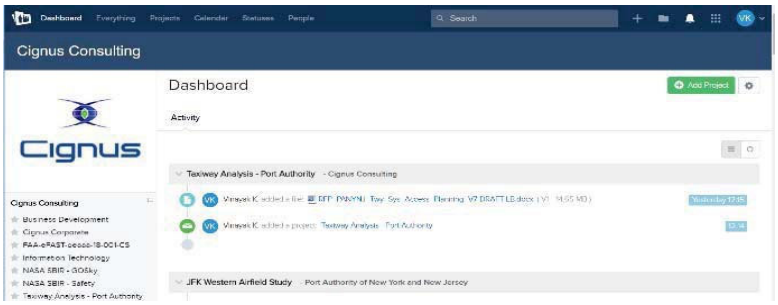


Figure 4: Teamwork Task & Time Tracking and Management

Cignus currently uses an approved financial management and accounting system that will be used by Dr. Hafner to implement cost management procedures. This proven system allows Cignus to track costs and cumulative expenditures for each subtask. The automated system allows our Team and WSDOT to understand, analyze, modify, and report on plans, budgets, work authorization, and cost accumulations. Our time and expense system, called Teamwork, will interface with the system to record hours and expenses incurred on a task-by-task basis. The automated financial management system, through processing this information, will generate a cost status report, comparing budgeted cost with expenditures and providing estimates of committed costs. The cost status report, in turn, will supply the basic information for the monthly reviews with WSDOT and allows the task managers to understand the budget status with respect to actuals on a monthly or even weekly basis.

Team Collaboration Platform

The Cignus Team understands that it is imperative for any successful project to have open and active communication as well as ongoing information exchange with not only the internal team members but also with the client. This type of active communication enables accountability, delivery, timeline management and most importantly budget management. To that end, our team will use our **Microsoft Teams and Sharepoint** collaborative tools to manage, execute, communicate and share documents and files. This online platform will provide information

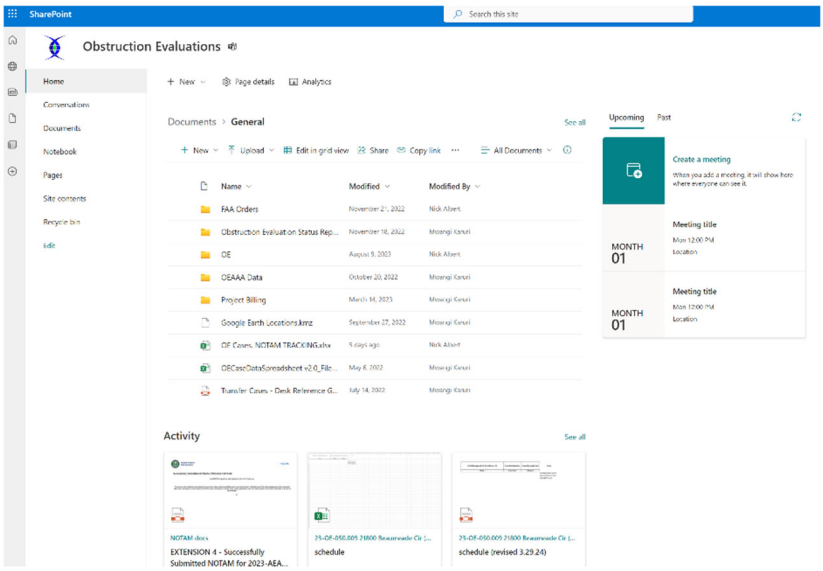


Figure 5: Microsoft Sharepoint Site Example

sharing access to WSDOT staff as well as the internal project team and will help everyone collaborate in an open, constant and seamless manner. Some of the highlights of this tool are:

1. Project Management with dedicated file sharing, versioning and archiving - you see what we see – you see what we work on - you can download any document when you need it
2. Project file delivery - All files will be stored as agreed with WSDOT on this site and will only be accessed by team members authorized and will remain archived for collaboration and delivery indefinitely. All staff will know when a new file has been added or an old one modified with updates
3. Internal team coordination and interaction – The tool allows for seamless communication between team members with the ability to add external stakeholders to the team as guests.

Cignus has utilized these processes and applications on several task-based projects including programs with multiple subcontractors. Some examples are:

- *Sonoma County Airspace and Procedure Planning* where Cignus currently manages more than 3 sub-contractors as prime
- Our on-going *FAA UAS Integration into the NAS Policy* support work where, as a sub-contractor, our system interfaces with the cost accounting and financial management system of the prime contractor
- Our *FDOT and VDOT state aviation system* planning projects where we track and manage tasks and timesheets

Communication with internal team, client, and/or stakeholders:

Dr. Hafner is responsible for the overall project delivery and will actively participate in the communication of daily work task activities from beginning to end. He will be the primary contact with WSDOT Project Manager. Our team will prepare draft agendas for approval in advance of meetings and will prepare draft minutes for review and approval within three days after each meeting. In between meetings, email and teleconferences may be used for frequent communications with WSDOT and our team but telephone or in-person discussion is always preferable. We are sensitive to the need for ensuring that communication is clear and that channels are kept open among all team members. Dr. Hafner is committed to ensure the expectations of WSDOT for this assignment are met and the deliverables are accurate and submitted in a timely manner. Our Team understands and commits that there will be no communication with outside public or private agencies, companies, officials, or members of the public unless approved in advance by WSDOT.

Appropriate Cignus team staff will be available and attend the kick-off, milestones, and other pertinent meetings with WSDOT for the duration of the assignment. Cignus will take detailed notes during each meeting and submit draft meeting minutes within five business days, incorporating WSDOT comments as appropriate and required follow-up actions, and resubmit as final following revisions within three days of receiving the comments.

5. Project Delivery Approach

As the Statement of Work indicates, although the benefits of AAM are evident, the concept also presents a variety of challenges that need to be addressed to enable successful integration and operation at the state level. Addressing these challenges requires a multidisciplinary and cross-agency approach involving various stakeholders, including government agencies, industry partners, academia, and the community. Collaboration across state boundaries may also be necessary given the potential for AAM operations to cross into multiple jurisdictions.

As noted, some of these challenges include but are not limited to:

- *Legislation and Regulation*. Develop strategies and plans to coordinate local, state, and federal agencies in terms of AAM operational, technological, and safety requirements.
- *Safety and Certification*: AAM vehicle as well as vertiport safety standards.
- *Infrastructure Development*: Research and define necessary infrastructure, such as vertiports and charging stations including funding mechanisms.
- *Airspace Management*: Coordinate operational concepts and systems with FAA and other stakeholders such as NASA for UTM.
- *Environmental Concerns*: Assessing and mitigating the environmental impact of AAM, including noise pollution and emissions.
- *Public Acceptance and Education*: Educate public about the benefits and safety of AAM.
- *Emergency Services Integration*: Integration of AAM into existing emergency services for uses such as air ambulances or disaster response.
- *Technology Standardization*: Promote or adopt standards for technologies used in AAM to ensure interoperability and safety.

Our team plans to work with WSDOT and relevant stakeholders to address these challenges through the definition of a detailed AAM integration roadmap and strategy. This roadmap takes a broad view across the entire state of Washington, both in terms of the geographic area and coverage as well as the inter-connectivity between transportation systems and access to the population.

The following sections will outline our proposed work plan and deliverables in more detail.

A Work Plan Development

The development of a work plan is a structured process that is tailored to the specific project and project team. The phases for this work plan include:

KICKOFF & PLANNING

Our team will work with WSDOT to define project scope and objectives and understand the basic stakeholder groups that need to be involved as well as the necessary activities that are required and map them against resources available. This provides WSDOT with the opportunity to review and comment on strategic direction and resources, define requirements and constraints, and approve the final work plan.

During this process, our team will also firm up the project timeline and deliverables – both in terms of content and delivery schedule – and review the project budget based on scope and delivery discussions.

A key aspect of the initial kickoff and planning process will be clearly defining the objectives that addresses various aspects of infrastructure development, governance structures, regulatory mechanisms, and policy considerations. Our objectives will focus on conducting a thorough inventory

of infrastructure needs to support a statewide vertiport network and devising a program to allocate funds to local governments for infrastructure development. Through a collaborative effort, we will define goals for recommending policies to foster vertiport and vertistop infrastructure development, emphasizing open public access, efficient land use siting, and equitable distribution across the state. Through a coordinated effort and stakeholder engagement, we aim to establish a robust framework for the successful implementation of AAM infrastructure across the state. This task will enable the Cignus team in collaboration with WSDOT to set up key performance measures, goals, and objectives to measure the project success.

An initial analysis and presentation of potential risks and mitigation strategies will be a core part of this process to ensure that the project execution and delivery expectations are met.

PROJECT WORK PLANNING

Given the large and varied scope of this project, our proposed approach will divide team members into pre-defined teams based on their experience and the proposed improvement concepts at hand. Each team will be assigned tasks based on a relevant functional area and/or area of concern/expertise. Our main teams and task breakdowns will be based on the main challenges highlighted by the SOW which include safety, regulation, infrastructure, and public acceptance. Team leads will communicate documentation, results, and recommendations to the entire team and the WSDOT through the project manager. Teams will also work with relevant stakeholders – as coordinated and approved by WSDOT – throughout the study and task process to communicate findings and ensure feedback is continually considered. The composition of these teams will be coordinated with the WSDOT to ensure overall project efficiency and to deconflict and maximize stakeholder engagement across the various analysis tasks. Our proposed work breakdown structure (WBS) and teaming approach centralizes knowledge and expertise along areas of specialization and creates more nimble and active work environments to assess the various requirements and deliverables in the SOW.

Documentation in the form of working documents, correspondence, meeting minutes, analyses, research, statewide plan, and other technical documents developed throughout this project will be maintained on our Microsoft Teams Sharepoint site and will be continuously available for review by designated team members including WSDOT. A complete set of data from this Teams library will be transmitted to the WSDOT at the conclusion of the study.

Task submissions to WSDOT per the deliverables schedule noted throughout this proposal will be compiled in the form of short Technical Memorandums with attached working papers, project sheets, analysis results, and research documentation as available. Formal draft and final reports will be prepared and submitted to WSDOT for review. Feedback and comments will be incorporated into submissions within five (5) business days before being ready for final approval.

After approval from WSDOT, the project work plan will be shared with stakeholders through a transparent and collaborative process to solicit their input and ensure buy-in. From the kickoff meeting, our approach will be organized to introduce stakeholders to the project's objectives, scope, and timeline. During this meeting, the work plan will be presented in detail, outlining the project's phases, tasks, milestones, and responsibilities. Following the kickoff meeting, regular communication channels will be established to keep stakeholders informed of progress and upcoming activities. Stakeholder engagement sessions will be conducted throughout the project to gather feedback, address concerns, and incorporate suggestions into the work plan as appropriate. Additionally, draft versions of the work plan will be circulated for review and comment, allowing stakeholders to provide input and revisions before finalization. By fostering open communication and collaboration, we aim to ensure that the project work plan reflects the collective goals, needs, and priorities of all stakeholders, resulting in greater alignment and buy-in throughout the project lifecycle.

EXECUTION

The execution phase will be aimed at realizing the vision outlined in the plan. At the outset, the

execution phase involves the implementation of strategies outlined in the plan, translating conceptual ideas into actionable steps. This includes the deployment of resources, coordination with stakeholders, and adherence to established timelines and milestones. Key tasks during this phase include developing recommendations for AAM land-use planning, evaluating existing infrastructure, reviewing infrastructure requirements, developing funding plans, defining state level policies and regulatory frameworks, engaging stakeholders, and developing the finalized AAM integration plan.

Central to the execution phase is the collaboration with stakeholders at the local, state, and federal levels to ensure alignment and support for the plan's implementation. Our team will ensure continuous monitoring and evaluation of progress to track performance, identify challenges, and adjusting as needed. This involves establishing monitoring mechanisms, collecting relevant data, and conducting periodic assessments to measure progress against established goals and objectives.

Risk management practices will be integrated into the execution phase to identify, assess, and mitigate potential risks that may impact the successful implementation of the plan. This involves conducting comprehensive risk assessments to identify potential threats and vulnerabilities, analyzing their potential impacts, and developing mitigation strategies to minimize their likelihood and severity. Risk management activities will be integrated into project planning, decision-making processes, and operational activities to proactively address risks and ensure the resilience of the AAM integration plan.

CLOSEOUT

At the conclusion of the project, a thorough review will be conducted to assess the effectiveness of the work plan and identify valuable lessons learned for future projects. This evaluation will involve examining key performance indicators, such as adherence to timelines, achievement of milestones, and successful completion of deliverables, to gauge the overall effectiveness of the work plan in guiding project execution. Additionally, stakeholders will be engaged to gather feedback on their experiences with the work plan, including any challenges encountered and suggestions for improvement. Through this comprehensive review process, valuable insights and lessons learned will be identified, documenting best practices, areas for enhancement, and strategies to mitigate risks in future projects. These lessons learned will be documented and shared with relevant stakeholders to inform and improve the planning and execution of future projects, ensuring continuous improvement and maximizing project success.

AAM INTEGRATION TEAM (AIT)

With the amount of stakeholders that may potentially need to be considered through the definition of an AAM roadmap for WSDOT, our team proposes the standup a steering committee that guides decision-making efforts in terms of work plan development, scope, documentation, and stakeholder engagements. The AIT charter would be to provide project oversight as well as the function to identify and address issues across the project team and with external stakeholders.

Given the size of the proposed project, we would still propose that a core AIT structure be put in place to define, review, and oversee tasks associated with the work plan. The charter for the AIT includes:

- Project Oversight
- Work Scope & Requirements Management
- Risk/Issue Management
- Contingencies
- QA/QC

The AIT should be composed of representatives from the following:

- Project Manager – Dr. Florian Hafner
- Key Project Team Members
- WSDOT Project Managers and Sponsor
- Key Stakeholders

B Work Breakdown Structure and Deliverables

Based on the requirements presented in the SOW and the anticipated deliverables and work products, our team has defined the following tasks to successfully execute this study:

TASK 1: KICKOFF & PROJECT INITIATION

After the award, we will work with WSDOT to confirm the scope of the initial work effort and define delivery milestones and products. Our project manager, Dr. Hafner, with appropriate key team staff will attend the kickoff meeting to discuss project scope; review, discuss, and offer suggestions to any modifications to the scope per the direction of WSDOT if necessary; and receive 'marching orders' from WSDOT along with any anticipated concerns throughout the project.

Deliverables: Agreed-upon work plan between Cignus and WSDOT.

TASK 2: STAKEHOLDER ANALYSIS AND ENGAGEMENT

Stakeholder engagement will be a continuous process throughout the implementation of this project. The consultation process involves collaborating with various entities, including local jurisdictions, planning organizations, and other modal managers, to solicit input and recommendations for integrating AAM aircraft into existing transportation frameworks. By actively involving these stakeholders, their expertise and perspectives will be leveraged to develop comprehensive strategies that address key considerations such as infrastructure needs, regulatory requirements, and community impacts. Through dialogue and collaboration, recommendations will be tailored to reflect the unique needs and priorities of different regions within the state, ensuring that AAM integration efforts are aligned with broader transportation goals and objectives.

Our team will develop a stakeholder engagement plan and community outreach program which is fundamental to the successful integration of AAM into statewide transportation plans. We will perform a stakeholder analysis to identify key stakeholders and their respective interests, concerns, and potential roles in AAM integration efforts. This analysis will inform the development of tailored engagement strategies to effectively involve stakeholders throughout the planning and implementation process. We will prioritize inclusivity and transparency, ensuring that all relevant stakeholders, including local communities, government agencies, industry partners, advocacy groups, and the general public, have the opportunity to participate and provide input.

Our stakeholder engagement plan will employ a variety of communication channels and outreach methods to facilitate meaningful dialogue and collaboration. This will include hosting stakeholder meetings, workshops, and focus groups to gather feedback, share information, and address concerns. Additionally, we will leverage digital platforms, such as websites, social media, and online surveys, to reach a broader audience and encourage participation from individuals who may not be able to attend in-person events. Through these channels, stakeholders can stay informed about project developments, provide input on key decisions, and contribute to the development of AAM integration plans.

As part of our AAM integration report, we will evaluate the best community outreach practices for this study while bringing to bear lessons learned from prior similar studies such as our NASA AAM National Campaign work as well as our community outreach efforts in Sonoma County. Our community outreach program will focus on building awareness, fostering understanding, and cultivating support for AAM integration among local communities. We recognize the importance of engaging with communities early and often to address potential concerns, dispel misconceptions, and build trust. Our approach will involve conducting targeted outreach efforts, such as public meetings, information sessions, and educational campaigns, to provide residents with accurate information about AAM technologies, benefits, and potential impacts. We will also prioritize two-way communication, actively listening to community feedback and incorporating it into decision-making processes to ensure that AAM

integration efforts align with community values and priorities.

Deliverables: Stakeholder engagement plan, Stakeholder feedback and recommendations,

TASK 3: DEVELOP RECOMMENDATIONS FOR AAM LAND-USE PLANNING

Our team will develop near, mid, and long-term recommendations for land use planning for the implementation of vertiports and vertistops that accommodates the anticipated growth of AAM/UAM, ensuring compatibility with existing urban planning, environmental sustainability, and community integration.

The overall approach is to analyze current land use and propose modifications to accommodate vertiports and vertistops and provide guidelines for site selection, zoning changes, and community impact assessment as WSDOT plans to integrate AAM/UAM infrastructure within the existing transportation network. Our team will detail site selection criteria and provide initial ideas for candidate sites for vertiports/vertistops across the State of Washington.

Our team will analyze current state and local zoning laws and urban plans and subsequently start to evaluate current land use and identify potential sites for AAM/UAM infrastructure across the state. Existing studies regarding AAM integration at the state level, economic impact assessments, and other research projects and practices from early adopters of AAM/UAM infrastructure will be considered and the team will start to engage with stakeholders for initial feedback (e.g., local governments, communities, AAM/UAM service providers).

Deliverables: Technical Report outlining land use recommendations

TASK 4: DEVELOP INFRASTRUCTURE REQUIREMENTS AND FUNDING PLANS

As part of our evaluation of the infrastructure requirements, Team Cignus will perform a comprehensive evaluation of existing and potential new infrastructure required for successful implementation of AAM in the State of Washington. In addition to eVTOL take-off and landing site evaluations, infrastructure considerations include current local land use (e.g., school, hospital, park, or other noise sensitive areas), emergency response (e.g., fire stations), and direct connection to other transportation options.

Our team will conduct thorough research and analysis to determine the precise infrastructure needs for establishing and maintaining a robust vertiport network, including the identification of suitable locations, assessing the necessary facilities and equipment, and evaluating regulatory and environmental considerations. The main considerations taken during the requirement analysis will include:

1. **Evaluation of Aircraft Types and Use Cases** - To properly outline the infrastructure required to make AAM a reality, our team will start with a good understanding of the types of vehicles and use cases utilizing the infrastructure. Although passenger carrying air taxis are the primary market target, secondary markets include package delivery drones, heavy freight drones, small electric training and commuter aircraft, and larger hybrid electric passenger and cargo aircraft. Use cases will range from the use of eVTOLs to support cargo operations, to passenger transportation within the urban environment, and emergency medical support services when transporting vital blood, organs, and other medical supplies between hospitals.
2. **Airspace Evaluation** - An evaluation of the airspace considerations within the state of Washington will help WSDOT identify critical components to developing a comprehensive AAM requirements analysis. An identification of potential aerial corridors which allow lower altitude aircraft traffic to maneuver in a more orderly, efficient, and secure manner. Determining corridor pathways for AAM operations will require coordination with FAA air traffic control (ATC).
3. **Weather Reporting Systems** - Operations in urban areas will pose unique challenges, especially for smaller aircraft, such as package delivery UAS, that may operate near ground and/or building level. A system of micro-weather monitoring stations can be installed to provide UAS operators with additional situational awareness when flying near urban centers. Our evaluation of

infrastructure requirements will include the deployment of such weather reporting service.

4. **Electrical Capacity and Power Generation** – Building on WSDOT Electric Aircraft Feasibility Study conducted in 2020 that identified that the key infrastructure needs for airports will occur on the airside to provide power and charging capabilities for electric aircraft, our team will evaluate current charging infrastructure within Washington State, the electrical grid ability to meet eVTOL demand, and the ability for potential vertiport locations identified to provide sufficient electricity.

Once the infrastructure requirements are clearly outlined, Team Cignus will develop a funding plan that incorporates various sources of financing to cover the costs of construction, operation, and maintenance of the vertiport network. This funding plan may include a combination of public and private investment, government grants, bonds, user fees, and partnerships with transportation companies and stakeholders.

Team Cignus will also evaluate strategies to deploy funds to local governments in order to share costs and promote collaboration in the development of the vertiport network. This evaluation will involve establishing criteria for eligibility and allocation of funds based on factors such as population density, transportation needs, economic impact, and environmental considerations. Furthermore, the program will encourage local governments to work together to leverage resources, streamline processes, and maximize the efficiency of infrastructure development and utilization.

Deliverables: Inventory of infrastructure requirements, statewide vertiport funding plan, and local government funding allocation plan

TASK 5: DEFINE POLICIES AND REGULATORY MECHANISMS AT THE STATE LEVEL TO FOSTER AAM AND VERTIPORT DEVELOPMENT

As AAM operations start to take shape and additional transportation options and connections evolve, it will be necessary to engage, collaborate and coordinate regulations and management of this new transportation system in a more formal and standardized manner. Vertiport site selection processes and guidelines for infrastructure and vertiport design, zoning/construction code research, compliance and safety regulations will play a large role in what makes a site or AAM operational concept viable or nonviable.

Even though federal regulations and guidelines are still being drafted, alignment with national FAA efforts and proposed efforts such as Engineering Brief No. 105, Vertiport Design in September 2022 (FAA 2022), which applies to eVTOL aircraft flying in visual meteorological conditions need to be considered at the state level. Our team understands that state laws and local ordinances that are in harmony with accepted federal and international standards will likely reduce the entry barriers for local operations by vertiport developers and operators. For those municipalities looking to embrace AAM, having ordinances and codes in place that address zoning standards for aviation infrastructure along with conditional use permitting processes that recognize that laws and standards are still evolving and will likely require multiple levels of interdependent approvals is key to a sustainable AAM strategy and environment.

To develop a common understanding of the current ecosystem surrounding AAM regulatory frameworks, our team will evaluate the following national programs for best practices and relative policies to consider for WSDOT:

- FAA Engineering Brief No. 105, Vertiport Design
- Advanced Air Mobility Coordination and Leadership Act
- Advanced Aviation Infrastructure Modernization Act
- FAA Unmanned Aircraft Systems Test Site Program
- FAA Urban Air Mobility and FAA UAS Traffic Management Concept of Operations
- NASA Advanced Air Mobility National Campaign

Our team will approach the review of regulatory policy in a holistic manner, including legislative definitions of vertiports and AAM, assessing licensing of vertiports and aircraft registration, permitting and business licensing processes, zoning and vertiport overlay zones, land-use and transportation planning.

Based on this understanding, our team will develop proposed policies and legislative strategies for a longer term transportation planning process undertaken which incorporates land-use planning for future potential vertiport sites and aerial corridor planning. Our team will propose legislative frameworks and policies regarding vertiport, vertistop, and vertiplex infrastructure development that ensure open public access, efficiency in land use siting from other states to inform recommendations for the statewide plan's legislative framework and policies, and alignment with best practices and fostering seamless integration of AAM infrastructure across the state.

Deliverables: Inventory of infrastructure requirements, statewide vertiport funding plan, and local government funding allocation plan

TASK 6: DEVELOP AND DELIVER AAM INTEGRATION PLAN & ROADMAP

The primary leave-behinds for this project are the draft and final AAM integration reports which consolidate the land use planning recommendations, infrastructure requirements, funding plans, state governance regulatory frameworks, lessons learned, and stakeholder feedback. These deliverables will summarize and combine information from various working papers, technical memos, stakeholder engagement activities, analysis tasks, and regulatory frameworks into single artifacts for review by the WSDOT and other stakeholders.

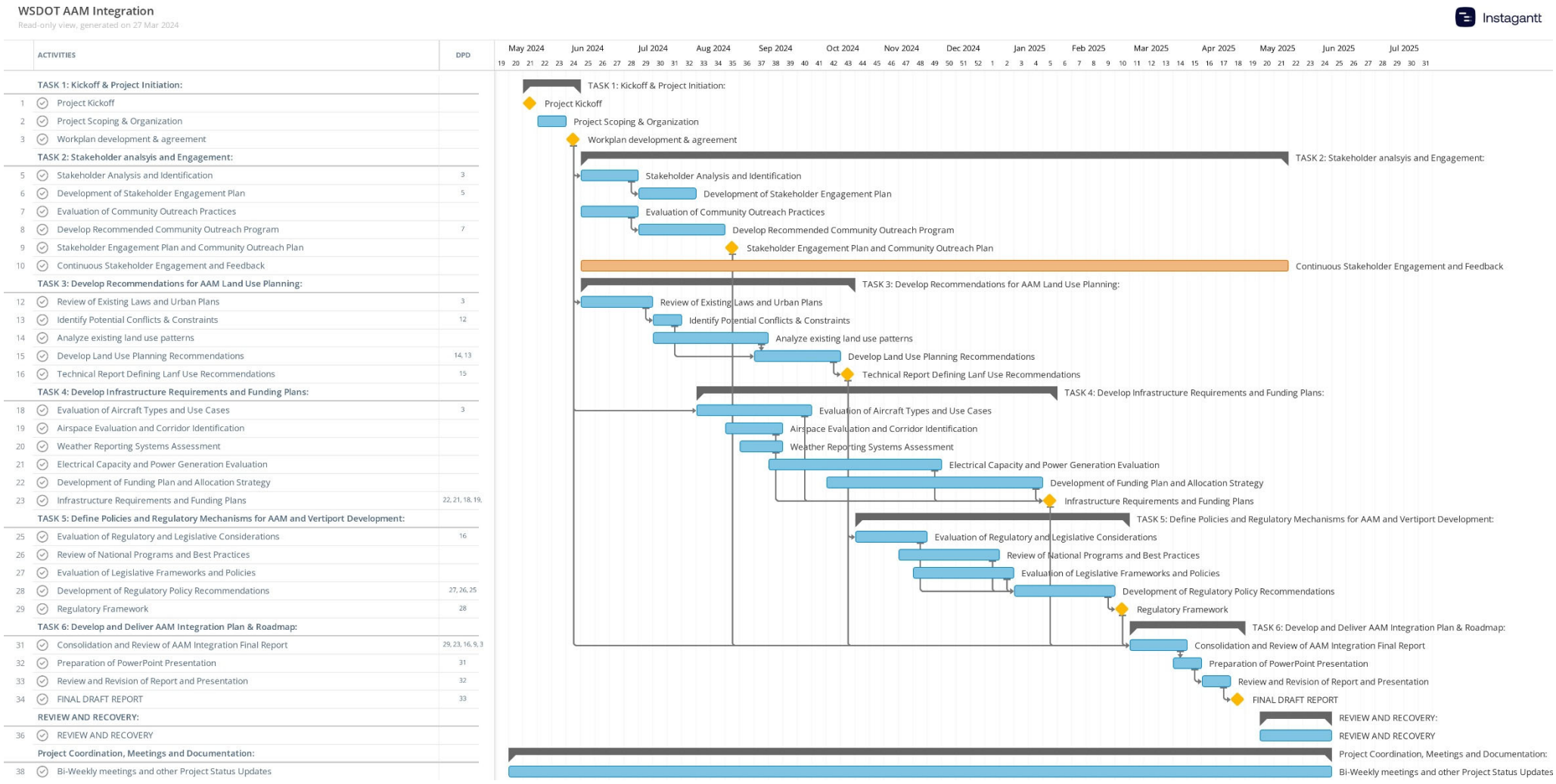
Our team will utilize or proven document development process to ensure adequate reviews are conducted to the consolidated draft final report which includes peer reviews, QA reviews, management reviews and customer reviews & approval, with adequate document recovery processes incorporated to ensure suggested edits are made.

Figure 6: UAM Strategy and Roadmap Review Process

We will prepare a PowerPoint presentation that will serve as a concise and engaging summary of the report's key findings, recommendations, and implications. We will develop a structured outline for the presentation, ensuring that it flows logically and effectively conveys the main messages of the report. Next, we will design visually appealing slides that incorporate charts, graphs, maps, and other graphics to illustrate key points and enhance audience understanding. The presentation will be crafted with the target audience in mind, using language and visuals that are accessible and easy to comprehend for legislators, WSDOT personnel, and the general public. The presentation will undergo a review process to gather feedback from stakeholders and ensure accuracy and clarity. Revisions will be made as needed based on this feedback, with a focus on refining the content and visuals to effectively communicate the report's findings.

C Schedule and Timeline

Given that the WSDOT needs to submit the report to the Office of Financial Management and Transportation Committees of the Legislature by June 1, 2025, the overall schedule for this study is aligned with this deliverable date as outlined in the following Gantt chart:



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